

2022

ZOOLOGY — HONOURS

Paper : CC-13

(Developmental Biology)

Full Marks : 50

*The figures in the margin indicate full marks.**Candidates are required to give their answers in their own words as far as practicable.*Answer **question no. 1** and **any four** questions from the rest.

1. Answer **any five** questions : 2×5
 - (a) Define spermiogenesis.
 - ~~(b)~~ Mention the types of egg on the basis of distribution of yolk.
 - ~~(c)~~ Mention the role of Sertoli cells in spermatogenesis.
 - (d) Distinguish between non-permeating and permeating CPAs.
 - ~~(e)~~ Mention different histological layers found in human placenta.
 - ~~(f)~~ Differentiate between totipotent and pluripotent embryonic stem cells.
 - (g) State the role of noggin in embryogenesis.
 - ~~(h)~~ What is seroamniotic raphe?
 - (i) Define differentiation.
2. ~~(a)~~ Give an account of growth phase of oogenesis. 5+5
 - ~~(b)~~ Describe various planes of cleavage with suitable diagram and example.
3. ~~(a)~~ Write a note on prevention of polyspermy during fertilization of sea urchin. 5+5
 - ~~(b)~~ Describe the process of primitive streak formation in chick with suitable diagram.
4. (a) Discuss the role of dorsal lip of blastopore during gastrulation of frog. 5+5
 - (b) Explain the process of primary induction in light of Spemann and Mangold's experiment.
5. (a) Write the process of optic cup and lens formation in chick embryo. 6+2+2
 - (b) Explain secondary induction with example.
 - (c) What is ingression?

Please Turn Over

autogenic
allogenic

X(6th Sm.)-Zoology-H/CC-13/CBCS

(2)

6. (a) State the properties of stem cells.
(b) How stem cells help in bone marrow transplantation?
(c) Mention name of two stem cell markers. 4+4+2
7. (a) State the advantages and disadvantages of *in vitro* fertilization.
(b) Mention the steps involved in embryo transfer.
(c) Give an illustrative account on the formation of compartments in vertebrate brain. 2+3+5
8. Write brief notes on : 2½×4
(a) Functions of amnion and chorion of chick
(b) Fate map in chick embryo
(c) Cryopreservation of spermatozoa
(d) Amphimixis.
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2022

ZOOLOGY — HONOURS

Paper : CC-14

(Evolutionary Biology)

Full Marks : 50

*The figures in the margin indicate full marks.**Candidates are required to give their answers in their own words as far as practicable.*Answer **question no. 1** and **any four** questions from the rest.1. Answer **any five** questions of the following :

2×5

- (a) What is mass extinction?
- (b) What is coacervate?
- (c) What is parapatric speciation?
- (d) Define 'parsimony'.
- (e) What is the 'golden era' of reptiles? Name different periods of this era.
- (f) Define 'biological species'. Mention two limitations of this species concept.
- (g) What is index fossil?
- (h) What is adaptive convergence? Give one example.
- (i) Define 'Darwinian fitness'.

2. (a) Define allopatric speciation. How it differs from sympatric speciation? Explain 'classical allopatric speciation' with a suitable example.

(b) Briefly narrate the process of species formation by chromosome rearrangements taking example from *Drosophila*. (2+2)+(3+3)

3. (a) State the atmospheric condition of pre-biotic earth.

(b) With suitable mathematical model explain how migration affects the allele frequency in a population.

(c) Briefly describe the radio-carbon dating method of fossil. 2+4+4

4. (a) State the characteristic features of

(i) *Australopithecus*; (ii) Cro-magnon man.

(b) Define isolating mechanism. Briefly describe different types of prezygotic isolating mechanism with suitable example. (2+2)+(1+5)

Please Turn Over

5. 'M' and 'N' blood groups of man are due to L^M and L^N alleles, respectively. Alleles are co-dominant. A sample of 426 individuals was typed for MN blood group with following results :

M	MN	N
238	152	36

- (a) Calculate the frequency of L^M and L^N alleles.
(b) Find whether the population is in Hardy-Weinberg Equilibrium.
(c) If frequency of L^N is 0.3, how many individuals in a population of 1000 would be expected with MN blood group? 4+4+2

6. (a) Give an account of progressive structural changes in evolution of horse with respect to teeth and toes.

- (b) What is neo-Darwinism? Name the factors that generate variations in genome according to neo-Darwinian concept. (3+3)+(1+3)

7. (a) Define natural selection. Explain directional selection with the help of suitable example.

- (b) What is genetic drift? Give one suitable example of natural genetic drift event. (2+3)+(2+3)

8. Write short notes on (*any two*) :

5×2

- (a) Adaptive radiation in finches

- (b) Urey-Miller experiment and its significance in origin of life theory

- (c) Trends in changes in structure of brain and limbs in human evolution.
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2022

ZOOLOGY — HONOURS

Paper : DSE-A(2)-2

(Animal Biotechnology)

Full Marks : 50

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

Answer question no. 1 and any four questions from the rest.

1. Answer any five questions :

2×5

- (a) What are phagemids?
- (b) Mention the source of Taq Pol and state one of its drawback.
- (c) Name one Restriction enzyme and its restriction site.
- (d) What are *ex-vivo* and *in-vivo* gene therapy?
- (e) What is Allele Specific PCR (AS-PCR)?
- (f) State the applications of RAPD.
- (g) What is an expression vector? Cite an example.
- (h) Mention the importance of Primer in PCR.
- (i) What is knock-out mice?

2. (a) Distinguish between Southern Blotting and Northern Blotting.

(b) Give the significance of EtBr and DNA marker in agarose gel-electrophoresis.

(c) What is blocking? State its significance in western blot.

3+2+(2+3)

3. (a) How can DNA fingerprinting technology be applied in forensic analysis?

(b) Briefly describe the procedure for construction of genomic libraries with proper diagram.

(c) What is DNA microinjection?

4+4+2

4. (a) What is BAC? Describe the configuration of YAC with a sketch.

(b) Write a note on 'Dolly' and 'Polly' cloning.

(c) How genetically modified economically important animals are beneficial to us?

(1+3)+4+2

Please Turn Over

5. (a) What is chimera? Mention the advantages of cDNA library.
(b) Mention the key steps associated with the cloning of animals by nuclear transplantation. (2+3)+5
6. (a) State the difference between conventional PCR and RT-PCR. What are the advantages of using real time PCR over conventional PCR?
(b) Enlist the equipments needed in animal cell culture.
(c) How can cystic fibrosis be detected through molecular diagnosis? (3+2)+2+3
7. (a) Comment on the application of lipofection in gene therapy.
(b) Discuss briefly about the non-viral delivery system in gene therapy.
(c) Briefly discuss about the various physical methods of gene transfer in the target cell. 3+3+4
8. Write short notes on (*any four*): 2½×4
- (a) Organisation of *Drosophila* genome
 - (b) Restriction endonucleases and their types
 - (c) Cosmids
 - (d) LINES and SINES
 - (e) Drug farming
 - (f) PAGE
 - (g) Retroviral method of production of transgenic animals.
 - (h) Gene augmentation therapy
 - (i) ADA-SCID Gene therapy.
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2022

ZOOLOGY — HONOURS

Paper : DSE-B(2)-1

(Animal Behaviour and Chronobiology)

Full Marks : 50

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

Answer *question no. 1* and *any four* questions from the rest.

1. Answer *any five* questions :

2×5

- (a) What do you mean by eusociality?
- (b) Name the hormone that controls the 'light-dark cycle' in biological clock. Name its precursor amino acid.
- (c) Mention the periodicity of tidal rhythm and lunar rhythm.
- (d) What do you mean by cultural transmission?
- (e) Define polygyny with example.
- (f) What is 'Hamilton's rule'?
- (g) Mention two differences between kinesis and taxis.
- (h) What is nuptial flight?
- (i) What is sign stimulus?

2. (a) What is social organisation? Write characteristics of macropterous, brachypterous and apterous forms of termites.

(b) How new termite colony is established?

(1+2+2+2)+3

3. (a) What is habituation? How instinctive behaviour differs from learning behaviour? Give suitable examples.

(b) What is classical conditioning? What are its significances?

(2+3+2)+(1+2)

4. (a) What is parent offspring conflict? How the 'reproductive fitness' and 'inclusive fitness' get influenced by this?

(b) What is kin selection? Write down its adaptive significance.

(2+3)+(2+3)

Please Turn Over

5. (a) What do you mean by 'sexual dimorphism'? How does it control the mate choice in peacock?
(b) What is intrasexual selection? How it is exhibited in male-male competition? — Elaborate with relevant example. (2+3)+(2+3)
6. (a) 'Brood pouching and viviparity can be considered as examples of parental care in fishes'. — Elaborate with relevant examples.
(b) What is 'endogenous pacemaker'? Specify its role in controlling circadian rhythm. (3+3)+(2+2)
7. Distinguish between photic and non-photoc zeitgebers. How do they influence the migratory behaviour in birds? 6+4
8. Write short notes on : $2\frac{1}{2} \times 4$
(a) Geotaxis
(b) Reciprocal altruism
(c) FAP
(d) Sibling rivalry.
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